OUIII AR
569d

4-8 (1)

SOUTHEASTERN UTAH DISTRICT HEALTH DEPARTMENT

6 East Main
P.O. Box 800
Price, Utah 84501
(801(637-3671

P.O. Box 803, East Carbon, Utah 84520 – 888-4411
P.O. Box 644, Castle Dale, Utah 84513 – 281-2252
P.O. Drawer E, Moab, Utah 84532 – 259-5602
P.O. Box 127, Monticello, Utah 84535 – 587-2021
522 North 1st East, Blanding, Utah 84511 – 678-2723

11-27-89

cc: T. Carlson
T. Plessinger
K. Scotti
M. Sewell
D. Williamson
MRAP file
P. Mushovic/EPA
R. McLeod/State
from Brian Mathis

November 24, 1989

Peter Mygatt
Public Relations Specialist
U. S. Department of Energy
Grand Junction Projects Office
P. O. Box 2567
Grand Junction, CO 81502

Dear Mr. Mygatt:

On November 16, 1989 I attended a public comment meeting held at the San Juan County Courthouse in Monticello, Utah. The subject of the meeting was the proposed plan for cleanup of the Monticello Superfund site (Monticello millsite) .

I would like to make a comment relative to the proposed plan for management of the contaminated groundwater below and down-gradient of the site, and of the contaminated surface drainage area of Montezuma Creek which passes through the site.

My concern, and comment, is that the present/ future downstream uses of Montezuma Creek water have not been taken into consideration relative to the effect on human health and the environment. The proposed action is to implement passive restoration with institutional controls after the tailings are removed. This was explained by D.O.E.'s Mr. Dee Williamson to mean 60 years of enforced non-use of the groundwater during the natural flushing of the aquifer into Montezuma Creek.

The 50,000,000 + gallons of contaminated water exceed State and Federal water quality standards for 11 parameters, and if unsafe for human and animal consumption as drawn from a well, most certainly is unsafe as drawn from a stream. This would be especially true during the periods of time when stream flow is due essentially to groundwater drainage with no dilution effect from surface water runoff. Even if diluted by surface water, some of this water may add additional contaminates from the contaminated upstream portion of the Montezuma Creek drainage area which passes through the site. This contaminated drainage area has a proposed management plan of Supplemental Standards, which means it isn't considered worth cleaning up.

At least one person was present at the meeting who makes use of Montezuma Creek water downstream of the site, a Mr. Dalton. There may well be others. I propose that the final cleanup plan incorporate a suitable measure of health protection for all present and potential users of Montezuma Creek water.

Sincerely,

Gerald L. Jackson

Gerald L. Jackson
District Sanitarian

cc: Dave Ariotti, Southeast District Engineer
Utah Division of Environmental Health

4-8-2

OUIII AR
569d

DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

Norman H. Bangerter
Governor
Suzanne Dandoy, M.D., M.P.H.
Executive Director
Kenneth L. Alkema
Director

Bureau of Solid & Hazardous Waste
288 North 1460 West, P.O. Box 16690
Salt Lake City, Utah 84116-0690
(801) 538-6170

March 5, 1990

Dee J. Williamson
Department of Energy
Grand Junction Project Office
P. O. box 2567
Grand Junction, Colorado 81502-2567

RE: Proposed ROD wording for Operable Unit III

Dear Mr. Dee Williamson:

At our last meeting, the DOE requested the State of Utah submit proposed wording for Operable Unit III (Ground Water) for the Monticello Millsite ROD. We submit the following wording for you consideration:

Operable Unit III - Ground Water:

Remedial action of Operable Unit III addresses cleanup of the groundwater contamination. Operable Units I/II are scheduled to be completed over a five year period. Post surveillance reviews are scheduled under CERCLA at five year intervals commencing with removal of the source material.

During the remedial action of Operable Units I/II, the characteristics of the ground water (Operable Unit III) will be altered. Remedial action construction will cause three changes to the aquifer:

1) All surface water, a principle source of ground water, will be diverted around the site. This will cause unknown effects in the attenuation and chemical properties of soils below the site.

2) Prior to construction the site must be dewatered, thus removing a large amount of water from the aquifer. All water from dewatering and construction activities will be treated in an appropriate manner.

3) The contaminates soil in the aquifer will be removed during remedial action. The contaminated water retained in the contaminated soils will be removed with the soils.

The results of these changes will have an unknown effect on the characteristics of the aquifer.

Throughout construction of Operable Units I/II, a ground-water monitoring program of the alluvial and Burro Canyon aquifers will be conducted. This monitoring program will continue for three years after removal of the contaminated material. As monitoring continues during the three year period the DOE, EPA, and the State of Utah will periodically review the results of the monitoring data and determine what additional steps, if any, will be required to complete aquifer restoration. When sufficient data has been gathered to warrant a final decision for ground-water restoration, a Record of Decision will be produced for Operable Unit III.

Institutional controls will be implemented prior to construction. These controls will be maintained until the aquifer is in compliance with the prevailing standards.

If you have any question, please contact Steven Peterson at (801) 538-6170.

Sincerely,

Kent P. Gray
CERCLA Branch Manager

KPG/SJP/sjp

CC: Paul S. Mushovic

B 4-03

U.S. Department of Energy
Grand Junction Office
2597 B¾ Road
Grand Junction, CO 81503

JUL 09 1993

Mr. Jerry Olds, Assistant State Engineer
State of Utah, Division of Water Rights
P.O. Box 146300
Salt Lake City, Utah 84114-6300

Subject: Request for Application of Institutional Controls, Monticello, Utah

Dear Mr. Olds:

The U.S. Department of Energy-Grand Junction Office (DOE-GJO) requests that your office implement the use of institutional controls to prohibit future well installation and consumptive use of contaminated ground water in the shallow alluvial aquifer associated with the Monticello Millsite, Monticello, Utah. A technical justification for this request is included as Attachment 1. Copies of the draft-final *Remedial Investigation* and the draft *Feasibility Study* reports for this site can be provided, if necessary, for your review. The DOE awaits notification from your office stating that the justification for implementing institutional controls has been accepted.

The DOE-GJO is in the process of compiling maps of affected areas, property-specific legal descriptions, and existing ground water rights data for the affected areas to assist you with implementing this request. This information will be forthcoming. Additionally, it is the DOE-GJO's understanding that the development of an associated Ground Water Management Plan is the responsibility of your office. Please let us know if we can provide any assistance.

Should you have any questions or concerns, please contact Donald Metzler at (970) 248-7612.

Sincerely,

Michael K Tucker /for

Jack B. Tillman
Manager

Enclosure

cc w/enclosure:
D. Bird, UDEQ
P. Mushovic, EPA
L. Morten, UDEQ
M. Butherus, MACTEC-ERS
D. Richardson/Information Repository (2)
File: MSG1.6.2.2[DOE]

jbthouska.epa

Attachment 1

Justification for Use of Institutional Controls for Groundwater Associated with the Monticello Mill Tailings Site, Monticello, Utah July 1998

Executive Summary

Because contamination exists in the shallow alluvial groundwater on and downgradient of the Monticello millsite at concentrations that could cause significant human health risk, it is imperative that access to this water be prohibited until it can be demonstrated that contaminant levels no longer pose a risk to human health. Groundwater from the alluvial aquifer (in areas of concern downgradient of the millsite) is not currently used. Drinking water is supplied to these properties by the city of Monticello. Institutional controls should be applied by the Utah State Engineer's Office to ensure that future use of this groundwater does not occur.

Introduction:

Alluvial groundwater associated with the Monticello Mill Tailings Site (MMTS), Monticello, Utah (see Figure 1), is contaminated with radionuclides and metals. Future access to the contaminated groundwater must be controlled in order to ensure continued protection of human health. The application of institutional controls, an administrative procedure implemented by the State of Utah Engineer's Office, would provide the mechanism needed to limit contaminated groundwater access by prohibiting future well installations and consumptive use.

Background Information:

The MMTS is the site of a former vanadium and uranium mill that operated between 1942 and 1960. This Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site is being remediated by the U.S. Department of Energy (DOE). The U.S. Environmental Protection Agency (EPA) and the State of Utah, Department of Environmental Quality (UDEQ) have oversight authority. Operable Unit (OU) III of the MMTS includes contaminated groundwater at and downgradient of the Monticello millsite.

Mill tailings and associated contaminated material that remain on the millsite as a result of historical uranium and vanadium milling operations are the primary sources of groundwater contamination. The mill tailings are in hydraulic contact with the shallow alluvial aquifer underlying the site. The DOE is in the process of remediating these source materials; a completion date of August 1999 is currently anticipated.

Lands within the OU III boundary east of the millsite (i.e., hydraulically downgradient) have been and are currently used for residences, farming, grazing, and recreation. Because most of the properties within the OU III area are privately owned or controlled by the U.S. Government, the

general public has limited access to the properties. Groundwater from the alluvial aquifer is not currently used as a source of drinking water, irrigation, livestock watering, or for industrial purposes within the OU III boundary. Municipal water is supplied to residents within the OU III area by the city of Monticello.

As required by CERCLA, the OU III groundwater has been extensively studied in order to obtain a full understanding of the site and the nature and extent of the contamination. A map showing the locations of monitoring wells used to characterize the site is included as Plate 1. The MMTS OU III *Remedial Investigation* report should be referenced for detailed characterization information. The DOE is presently evaluating remediation alternatives for the contaminated groundwater through the CERCLA-prescribed decision process.

Technical Support Information:
Hydrogeologic Setting - The hydrologic units associated with OU III are an upper alluvial aquifer consisting mostly of Quaternary alluvium and colluvium, an aquitard comprising Mancos Shale and Dakota Sandstone, and the underlying Burro Canyon Formation aquifer. Underlying the Burro Canyon Formation is the Brushy Basin Member of the Morrison Formation, which is considered relatively impermeable to groundwater flow.

The alluvial aquifer consists primarily of mixtures of alluvial sand, silt, gravel, minor clay and, to a lesser extent, windblown deposits (loess), hillslope colluvium, and weathered surfaces of the upper bedrock. It is laterally bounded by bedrock hillslopes and walls of Montezuma Creek canyon and vertically by competent bedrock.

Saturated thickness of the alluvial aquifer ranges from approximately 2 to 25 feet but is generally less than 15 feet. The alluvial aquifer is thickest along the natural channel of Montezuma Creek, coincident with the axis of topographical bedrock valley, and becomes much thinner and pinches out at the valley margins to the north and south. The central portion of the bedrock valley contains alluvial sand and gravel and is regarded as the primary conduit for groundwater flow in the alluvial aquifer.

Montezuma Creek flows through the millsite and is hydraulically connected to the alluvial aquifer. The alluvial aquifer is recharged by infiltration of precipitation, irrigation water, surface-water loss from Montezuma Creek, and lateral groundwater flow from upgradient of the millsite. Depths to groundwater generally range from 8 to 15 feet but reach 20 to 50 feet on the tailings piles. In the northwest area of the millsite, groundwater is within several feet of ground surface. Very shallow groundwater (less than 2 feet below grade) is also present in eastern Upper Montezuma Creek. Water levels in the alluvial aquifer fluctuate seasonally from low base-flow periods in the fall to high-flow periods in the spring. Typical fluctuations are approximately 2 to 5 feet.

Groundwater elevation data indicate that groundwater flow in the central portion of the alluvial aquifer is generally west to east, parallel to Montezuma Creek and the underlying bedrock valley axis. Along the northern and southern flanks of Montezuma Creek valley, groundwater flow directions are generally southeast and northeast toward the center of the bedrock valley, but may

be due south or north locally. An alluvial aquifer phreatic surface map produced from data obtained in March 1996 is included as Plate 2. The lateral hydraulic gradient in the alluvial aquifer ranges from 0.01 to 0.04 ft/ft in the central portion of Upper Montezuma Creek and from 0.08 to 0.10 ft/ft along the valley margins.

Transmissivity and hydraulic conductivity are very variable across the site. On the basis of aquifer pumping and slug tests, the calculated transmissivity is estimated to range from 400 to 4,800 square feet per day; the hydraulic conductivity in the alluvial aquifer is estimated to range from 5.2×10^{-5} to 1.5×10^{-1} centimeters per second.

Nature and Extent of Contamination - Groundwater samples from wells completed in the alluvial aquifer contain elevated concentrations (relative to background) of various metals, anions, and radionuclides related to uranium mill tailings. Organic contaminants are not a concern at this site.

Inorganic analytes that have been consistently detected in the alluvial groundwater on and downgradient of the millsite in concentrations above background include arsenic, copper, manganese, molybdenum, selenium, elemental uranium, vanadium, nitrate, sulfate, gross alpha and beta, lead-210 (Pb-210), radium-226 (Ra-226), radon-222 (Rn-222), thorium-230 (Th-230), and uranium-234 (U-234), U-235, and U-238. Table 1 lists the concentration range of each analyte detected in the reference area (background), on the millsite, and downgradient of the millsite. Sample concentrations significantly greater than the reference area's 95 percent upper confidence limit (UCL_{95}) are indications of groundwater contamination. Contaminant concentration generally decrease with distance from the millsite.

Arsenic, manganese, molybdenum, selenium, vanadium, uranium, and Pb-210 have migrated from the millsite and have contaminated downgradient alluvial groundwater. Selenium, nitrate, and Ra-226 were detected in concentrations above applicable standards on the millsite only; molybdenum and U-234/238 were detected in concentrations above water cleanup standards set in 40 CFR Part 192 both on the millsite and downgradient of the millsite on private property. Contaminant concentrations tended to decrease with increasing distance from the millsite. Table 2 lists applicable groundwater standards for Utah, Federal Safe Drinking Water Act (SDWA), and Uranium Mill Tailing Remedial Action (UMTRA) Project. These standards are provided for comparison with detected contaminant concentrations.

Plume maps showing analyte distributions of arsenic, manganese, molybdenum, selenium, vanadium, Ra-226, U-234/238, and Pb-210 in the alluvial aquifer at the historically low-water-level time of year (fall) are attached as Figures 2 through 9. October 1995 groundwater sampling data were used to create the plume maps. Plume maps were not generated for copper or Th-230 because of the limited distribution of those metals. Detectable concentration were mainly associated with samples from millsite wells or wells just downgradient of the millsite. Table 3 provides a summary of the distribution of the most prevalent contaminants detected in concentrations significantly above background based on October 1995 data.

Time-concentration plots were prepared and indicate inconsistent trends of certain contaminants

over time. Several plots do not show a significant change in concentration over time, which suggests that the plume has reached a steady-state condition downgradient of the millsite. Other plots show the effect of dilution during high-flow times of the year and fluctuate consistently and inversely with the water level. However, not all wells exhibit a strong seasonal fluctuation in contaminant concentrations.

Human Health Assessment -
Contaminants of concern (COCs) that have migrated into the alluvial aquifer on and downgradient of the millsite and which have been determined to cause significant human health risk are arsenic, manganese, selenium, vanadium, uranium, Ra-226, and Pb-210. Selenium, Ra-226, and Pb-210 were detected in elevated concentrations on the millsite only. Ra-226 is relatively immobile in the alluvial aquifer and has not migrated beyond the eastern (downgradient) millsite boundary. In contrast, uranium is relatively mobile and exists in concentrations above background extending approximately 5,400 feet downgradient of the millsite. The remaining contaminants exhibit varying degrees of transport from the millsite sources compared to Ra-226 and uranium.

Concentrations of COCs in Burro Canyon groundwater were generally consistent with reference area (background) levels or were not consistently detected at a given location over time and therefore do not indicate contamination of the Burro Canyon aquifer.

A baseline human-health risk assessment was prepared during 1997 for OU III that evaluated risks to human health from groundwater associated with MMTS. The risk assessment approach involved selecting COCs using a process from EPA Region VIII that involved considering historical site information and comparing sampling results to regulatory benchmarks, acceptable intakes of essential human nutrients, and background concentrations. COCs for the MMTS groundwater are arsenic, manganese, selenium, uranium, and vanadium.

Currently, exposure pathways involving groundwater are not complete. Some additional future development is expected within Upper Montezuma Creek that may result in the use of the contaminated alluvial aquifer as a source of drinking water. Exposure receptors are potential future residents, agricultural workers, and recreational users. Children aged 5 to 14 years are the most sensitive subpopulation. The UCL_{95} of the mean concentration was used for all exposure point concentrations, as recommended by EPA. Exposure assumptions were developed on the basis of site-specific conditions and EPA guidance.

An assessment of exposure concluded that the most significant exposures are from the potential future ingestion of contaminated groundwater. The overall risk assessment results for future exposure based on ingestion of contaminated groundwater are presented in Table 4. Examination of this table supports the following conclusions:

- Risks from potential future ingestion of alluvial groundwater produce added cancer risks exceeding EPA's risk range of 1×10^{-4} to 1×10^{-6}. [A cancer risk of 1×10^{-4} is an added chance of cancer incidence (or mortality if the risk is from radionuclides) of 1 in 10,000 people attributable to exposure to site-related contamination.]

- Risks from potential future ingestion of alluvial groundwater produce a hazard indexes (HIs) greater than 1.0. (An HI of 1.0 or greater is a numerical indicator of the transition between acceptable and unacceptable exposure levels. HIs for OU III apply to noncarcinogen COCs.)
- Added cancer risks assuming the ingestion of alluvial groundwater under background conditions are within EPA's risk range; HIs are less than 1.0.
- Assuming the unlikely future use of contaminated alluvial groundwater as a drinking water source, this exposure path way results in considerably greater risks than the incidental ingestion of site-associated contaminated surface water. For example, added cancer risks from radionuclides are more than 400 times greater for future groundwater ingestion compared to incidental ingestion of surface water in Upper Montezuma Creek.

Additional, more detailed dicussions on the human-health based risk assessment for OU III surface and groundwater can be found in Section 2.4 of DOE's *OU III Feasibility Study of Surface Water and Groundwater* (March 1998).

Table 1. Comparison of Contaminant Concentrations in Alluvial Groundwater

Analyte	Reference Area				Millsite					Downgradient				
	Concentration[a] Range	Mean	UCL_{95}[b]	*N*[c]	Concentration Range	Mean	UCL_{95}	*N*	% Exceeding Reference Area UCL_{95}	Concentration Range	Mean	UCL_{95}	*N*	% Exceeding Reference Area UCL_{95}
Gross Alpha	ND[d]	16.2	18.9	26	34 – 9,780	1,700	2,090	73	95	6.7 – 2,330	487	588	69	91
Arsenic	3.0 – 3.6	1.42	1.77	20	3.0 – 256	48.2	59	63	75	1.1 – 42.2	9.0	11.3	68	57
Gross Beta	ND	12.3	14.5	26	20.9 – 4,230	554	695	73	90	4.6 – 1,040	171	206	69	91
Cobalt	ND	3.9	4.32	9	8.8 – 61.3	9.4	13.3	31	39	6.1 – 7.4	3.9	4.18	39	21
Copper	6.8 – 6.8	2.1	2.5	20	3.4 – 174	5.6	10.2	63	14	3.4 – 28.5	3.2	4.23	68	13
Lead	1.1 – 3.2	1.1	1.54	13	1.1 – 22.9	1.1	1.86	48	6	0.66 – 24.8	1.3	2.02	59	15
Lead–210	ND	1.0	1.0	24	1.5 – 91	11	14.7	66	65	0.36 – 36.8	4.4	5.72	63	48
Manganese	1.2 – 181	30.4	52.3	15	12.5 – 14,100	4,440	5,390	55	93	1.9 – 4,210	516	676	67	79
Molybdenum	1.4 – 3.6	4.4	5.98[e]	20	2.1 – 34,000	817	1,710	63	78	1.4 – 264	71.1	86.1	68	76
$NO_3 + NO_2$ as N	35.6 – 4,330	1,010	1,630	15	7.0 – 263,000	10,100	20,300	44	14	7.2 – 5,370	1,450	1,830	47	36
Ra–226	0.1 – 0.56	0.21	0.25	26	0.1 – 26.5	2.5	3.46	74	49	0.1 – 3.2	0.39	0.53	69	18
Rn–222	203 – 1,270	732	817	27	99 – 182,000	8,590	13,500	73	84	49 – 10,600	1,200	1,530	69	58
Selenium	1.6 – 5.1	2.1	2.82	20	1.3 – 395	15.3	25.7	63	56	3.5 – 57.4	11.3	13.7	68	68
Sulfate	70.8 – 1,430	580	718	26	316 – 5,820	1,340	1,500	74	70	112 – 1,720	830	885	69	72
Th–230	0.3 – 0.45	0.16	0.20	26	0.34 – 2.5	0.48	0.62	73	47	0.03 – 0.92	0.35	0.45	69	48
Uranium	2.5 – 6.3	4.8	5.29	17	21.6 – 12,600	1,830	2,370	56	100	0.58 – 2,870	700	837	55	96
U–234	0.37 – 5.4	3.1	3.6	25	10 – 3,130	674	813	69	100	0.39 – 968	213	251	67	93
U–235	0.42 – 0.49	0.19	0.25	21	0.39 – 194	40.9	51.4	55	91	0.02 – 51.1	9.8	12	55	95
U–238	0.38 – 3.1	1.7	1.95	25	7.9 – 3,200	685	827	69	100	0.25 – 986	216	255	67	96
Vanadium	ND	2.8	3.08	20	60.8 – 2,920	662	836	63	83	6.8 – 1,000	227	290	68	78
Zinc	2.9 – 29.7	6.4	9.81	15	2.7 – 27.3	7.1	8.5	55	25	2.2 – 27	6.7	7.79	67	18

[a] All concentrations are in µg/L except radionuclides (pCi/L) and SO_4 (mg/L); concentration ranges apply only to concentrations above detection limits.
[b] UCL_{95} = 95 percent Upper Confidence Limit.
[c] *N* = Number of samples analyzed.
[d] ND = Not Detected.
[e] Detection limits for some samples were 16 µg/L, yielding a mean greater than detected range.

Table 2. State, Federal, and UMTRA Groundwater Standards

Contaminant	State[a] (µ/gL)	Federal[b] (µg/L)	UMTRA[c] (µg/L)
Arsenic	50	50	50
Copper	1,300	At tap Action Level = 1,300	–
Molybdenum	–	–	100
Selenium	50	50	10
Zinc	5,000	–	–
Nitrate (as N)	10,000	10,000	10,000
Nitrite (as N)	1,000	1,000	–
Total Nitrate/Nitrite (As N)	10,000	10,000	–
Ra-226 and Ra-228	5 pCi/L	5 pCi/L	5 pCi/L
Rn-222	–	300 pCi/L (Proposed)	–
U (total)	–	20 (Proposed)	–
U-234 and U-238	–	–	30 pCi/L
Gross Alpha[d]	15 pCi/L	15 pCi/L	15 pCi/L

[a]Administrative Rules for Groundwater Quality Protection R317-6, Utah Administrative Code, UDEQ, Division of Water Quality, Revised April 15, 1994.
[b]USEPA Drinking Water Regulations, EPA Publication 822-B-96-002, October 1996.
[c]40 CFR Part 192, Subpart A: "Standards for the Control of Residual Radioactive Materials From Inactive Uranium Processing Sites," §192.04, Table 1.
[d]Excludes uranium and radon.

Table 3. Summary of Plume Maps

Contaminant	MCL[a]	UCL_{95}[a] Reference Area	UCL_{95}[a] Millsite	UCL_{95}[a] Downgradient	Exceeds MCL on Private Land?	Extent of MCL[b] (ft)	Extent of Plume[c] (ft)
Arsenic	50	1.77	59.0	11.3	Yes	100	1,400
Manganese	NA	52.3	5,390	676	NA	NA	3,900
Molybdenum[d]	100	5.98	1,710	86.1	Yes	900	4,200
Selenium	50	2.82	25.7	13.7	No	Millsite	4,200
Vanadium	NA	3.08	836	290	NA	NA	2,200
Ra-226	5 pCi/L	0.25	3.46	0.53	No	Millsite	Stays on Millsite
U-234/238[d]	30 pCi/L	3.6/1.95	813/827	251/255	Yes	5,000	7,000

[a]MCLs, UCL_{95}s in µg/L except radioactive contaminants (pCi/L).
[b]The distance from the eastern millsite boundary to the point where the UCL_{95} no longer exceeds the MCL (based on 10/95 data).
[c]The approximate extent of plume is the distance from the eastern millsite boundary to the point where contaminant concentration decreases to background concentrations (based on 10/95 data).
[d]Not MCLs but standards set in 40 CFR Part 192.

Table 4. Risk Characterization Summary: Future-Use Residential Scenario Involving the Consumption of Groundwater Only[a]

Assessment	OU III Setting		Background		Increment Above Background[b]	
	RME	CT	RME	CT	RME	CT
Added Cancer Risk, Nonradionuclides	4.2×10^{-4}	7.0×10^{-5}	3.0×10^{-5}	4.9×10^{-6}	3.9×10^{-4}	6.5×10^{-5}
Added Cancer Risk, Radionuclides	3.7×10^{-4}	8.2×10^{-5}	2.7×10^{-5}	5.4×10^{-6}	3.4×10^{-4}	7.7×10^{-5}
Hazard Index	10.0	5.5	0.2	0.13	9.8	5.3
EDE (mrem/yr)	10.0	6.5	1.9	1.2	8.1	5.3

[a]Groundwater consumption 10 years after millsite remediation.

[b]Example using added cancer risk, nonradionuclides: $4.2 \times 10^{-4} - 3.0 \times 10^{-5} = 3.9 \times 10^{-4}$.

Key: CT = central tendency; EDE = effective dose equivalent; RME = reasonable maximum exposure
mrem/yr = millirem per year

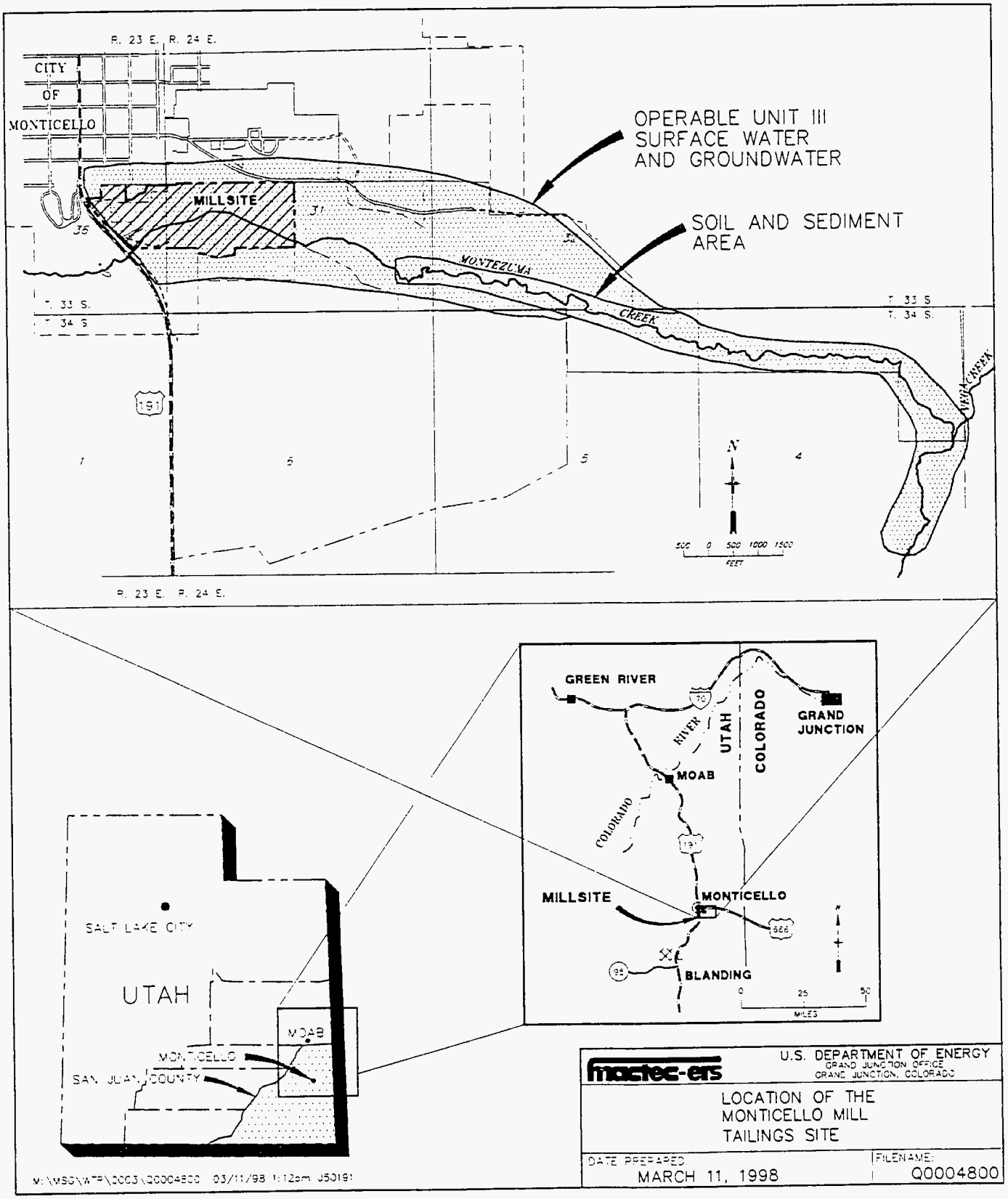
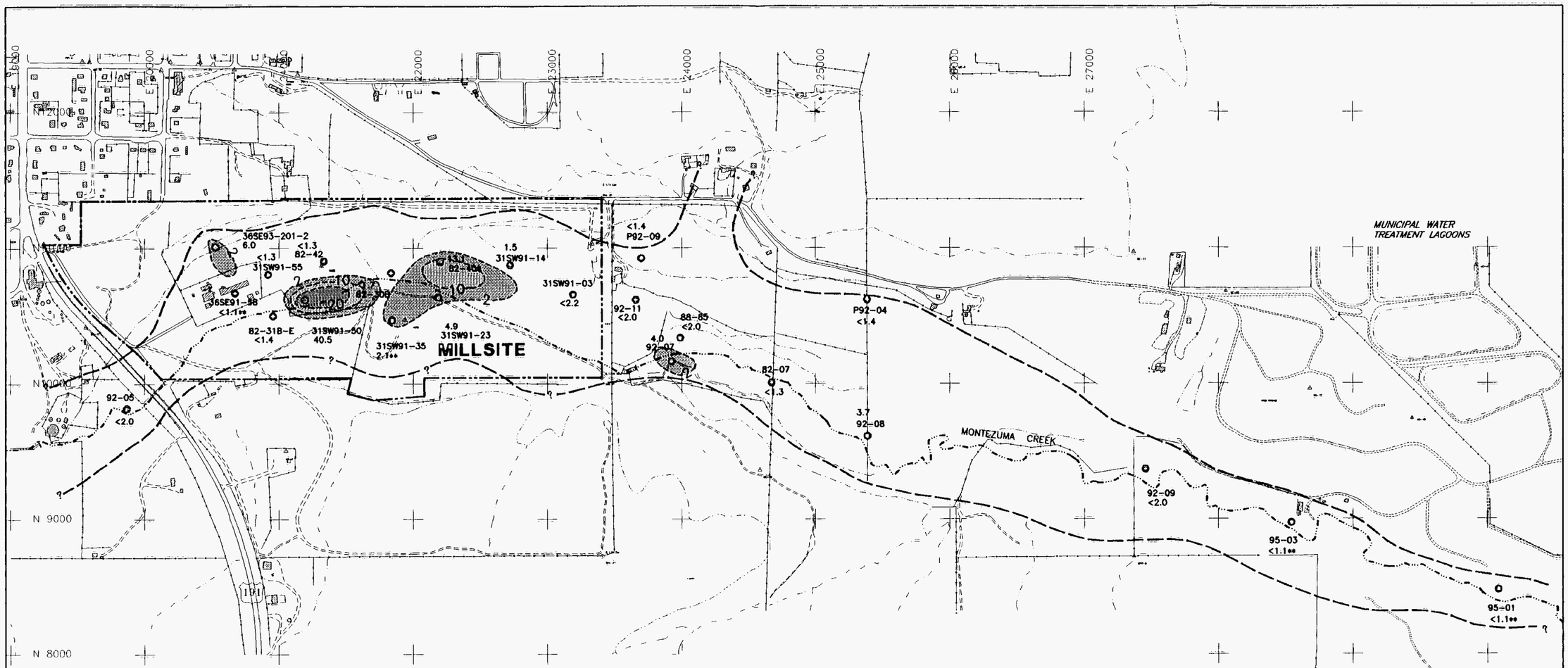


Figure 1. Location of the Monticello Mill Tailings Site



EXPLANATION

- 82-40A / 13.1 — WELL NUMBER / LEAD-210 ACTIVITY (pCi/L)
- ** = OCTOBER 1996
- 10 — CONCENTRATION CONTOUR (pCi/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET

800 400 0 800 1600 2400

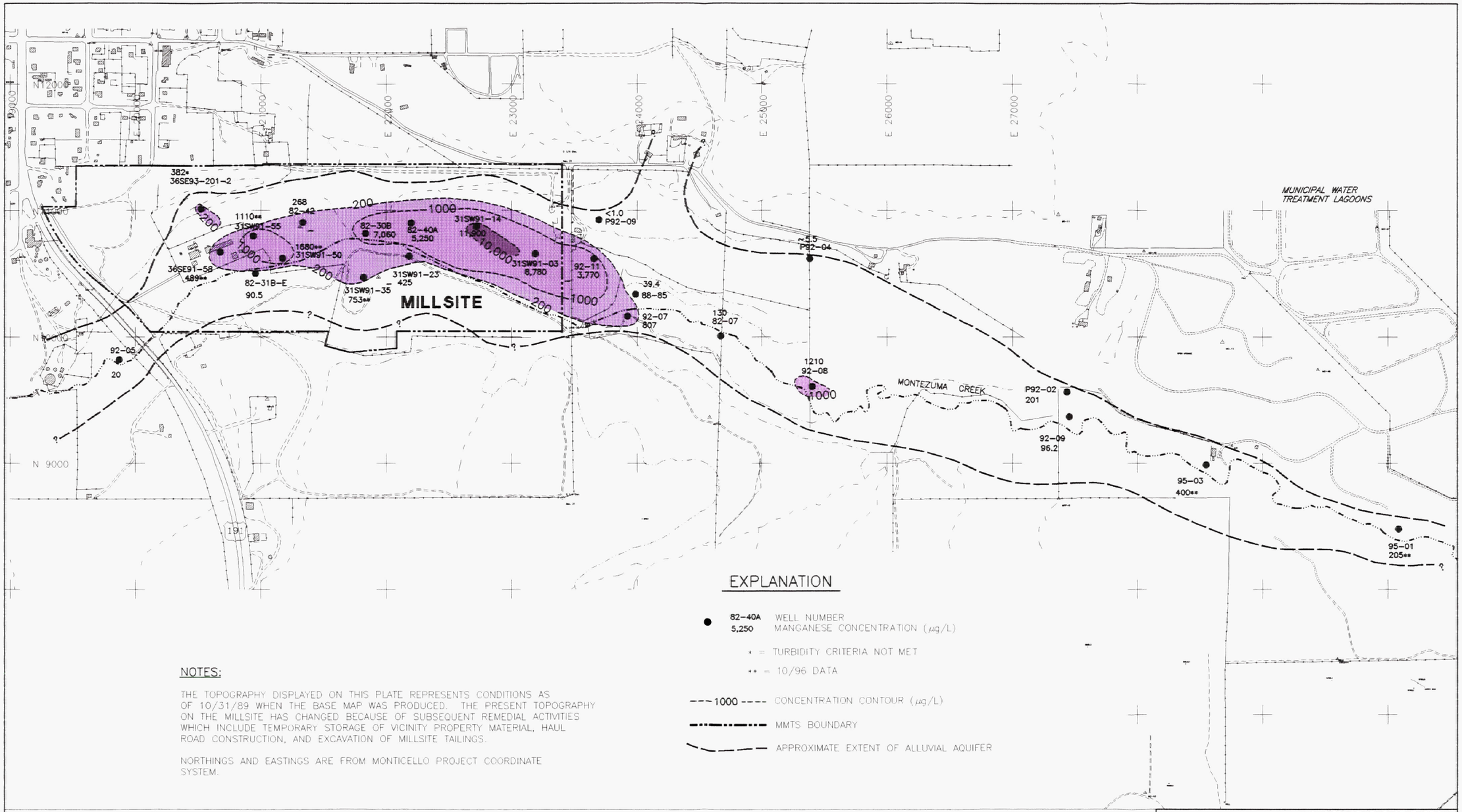
M:\MSG\WTR\0007\Q0007900 03/10/98 1:04pm J50191

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

LEAD-210 PLUME MAP OCTOBER 1995

DATE PREPARED: MARCH 10, 1998

FILENAME: Q0007900



EXPLANATION

- 82-40A / 5,250 — WELL NUMBER / MANGANESE CONCENTRATION (µg/L)
- * = TURBIDITY CRITERIA NOT MET
- ** = 10/96 DATA
- ---1000---- CONCENTRATION CONTOUR (µg/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET

800 400 0 800 1600 2400

M:\MSG\WTR\0001\Q00006-5 01/19/98 12:38pm J50191

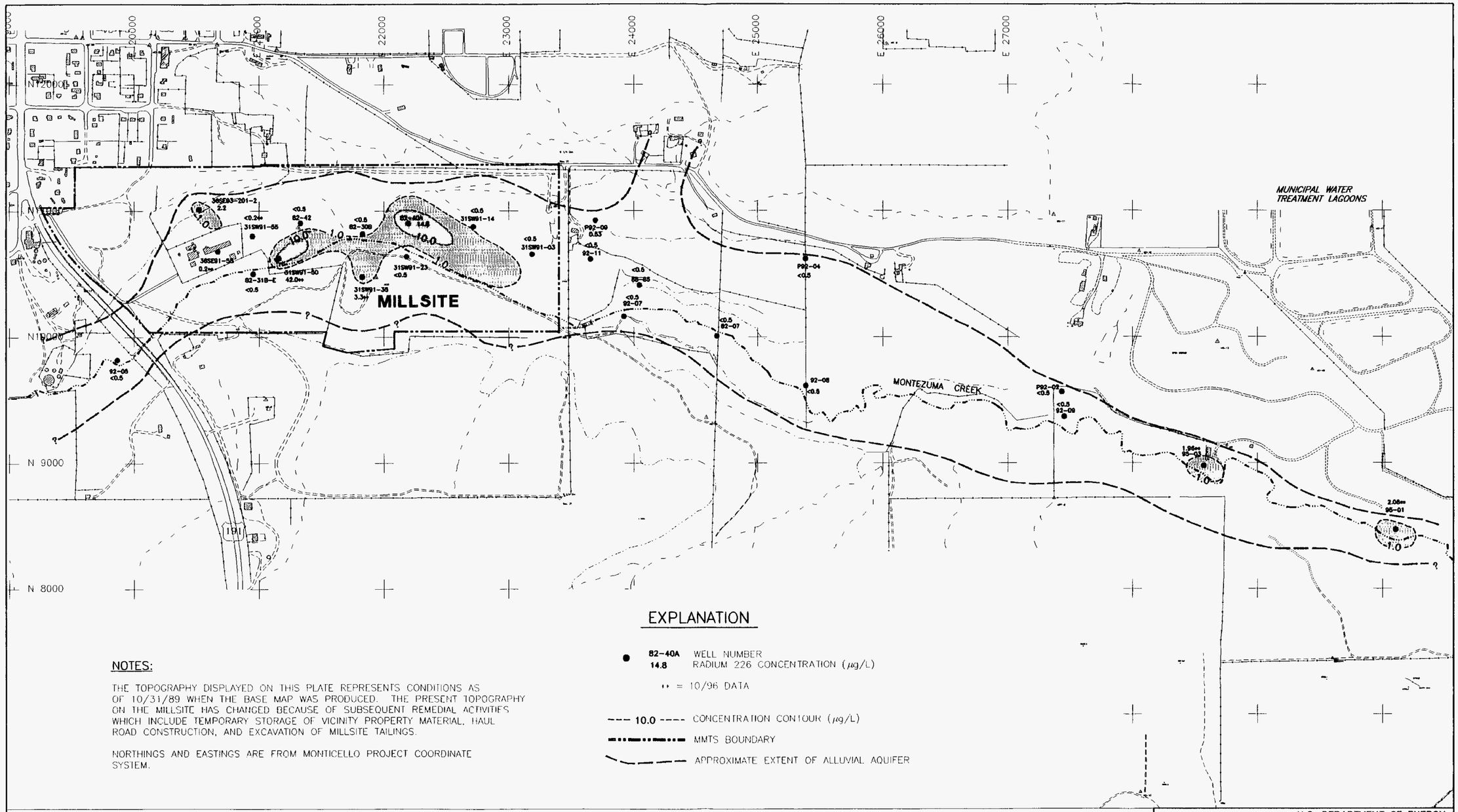
macTec-ers

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

MANGANESE PLUME MAP OCTOBER 1995

DATE PREPARED: JANUARY 19, 1998

FILENAME: Q00006-5



EXPLANATION

- 82-40A / 14.8 — WELL NUMBER / RADIUM 226 CONCENTRATION (µg/L)
- ** = 10/96 DATA
- 10.0 — CONCENTRATION CONTOUR (µg/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET

800 400 0 800 1600 2400

M:\MSG\WTR\0001\000007-5 01/19/98 1:26pm J50191

maclec-ers

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

RA-226
PLUME MAP
OCTOBER 1995

DATE PREPARED: JANUARY 19, 1998

FILENAME: Q00007-5

EXPLANATION

- 82-40A / 59.3 — WELL NUMBER / ARSENIC CONCENTRATION (µg/L)
- + = TURBIDITY CRITERIA NOT MET
- ++ = 10/96 DATA
- ---1000---- CONCENTRATION CONTOUR (µg/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET
800 400 0 800 1600 2400

M:\ECR\034\0011\A00425-5 01/18/98 4:28pm J50191

mactec-ers

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

ARSENIC PLUME MAP OCTOBER 1995

DATE PREPARED: JANUARY 18, 1998

FILENAME: A00425-5

EXPLANATION

- 82-40A / 61.8 — WELL NUMBER / VANADIUM CONCENTRATION (µg/L)
- * = TURBIDITY CRITERIA NOT MET
- ** = 10/96 DATA
- ---1000--- CONCENTRATION CONTOUR (µg/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET
800 400 0 800 1600 2400

M:\ECR\034\0011\RC\A00429-5 01/20/98 6:50pm J50191

mactec-ers	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO
VANADIUM PLUME MAP OCTOBER 1995	
DATE PREPARED: JANUARY 20, 1998	FILENAME: A00429-5

EXPLANATION

- 82-40A / 4,750 — WELL NUMBER / URANIUM 234 + 238 ACTIVITY (pCi/L)
- ** = 10/96 DATA
- 1000 — CONCENTRATION CONTOUR (pCi/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET

800 400 0 800 1600 2400

M:\ECR\034\0011\A00428-5 03/10/98 5:57pm J50191

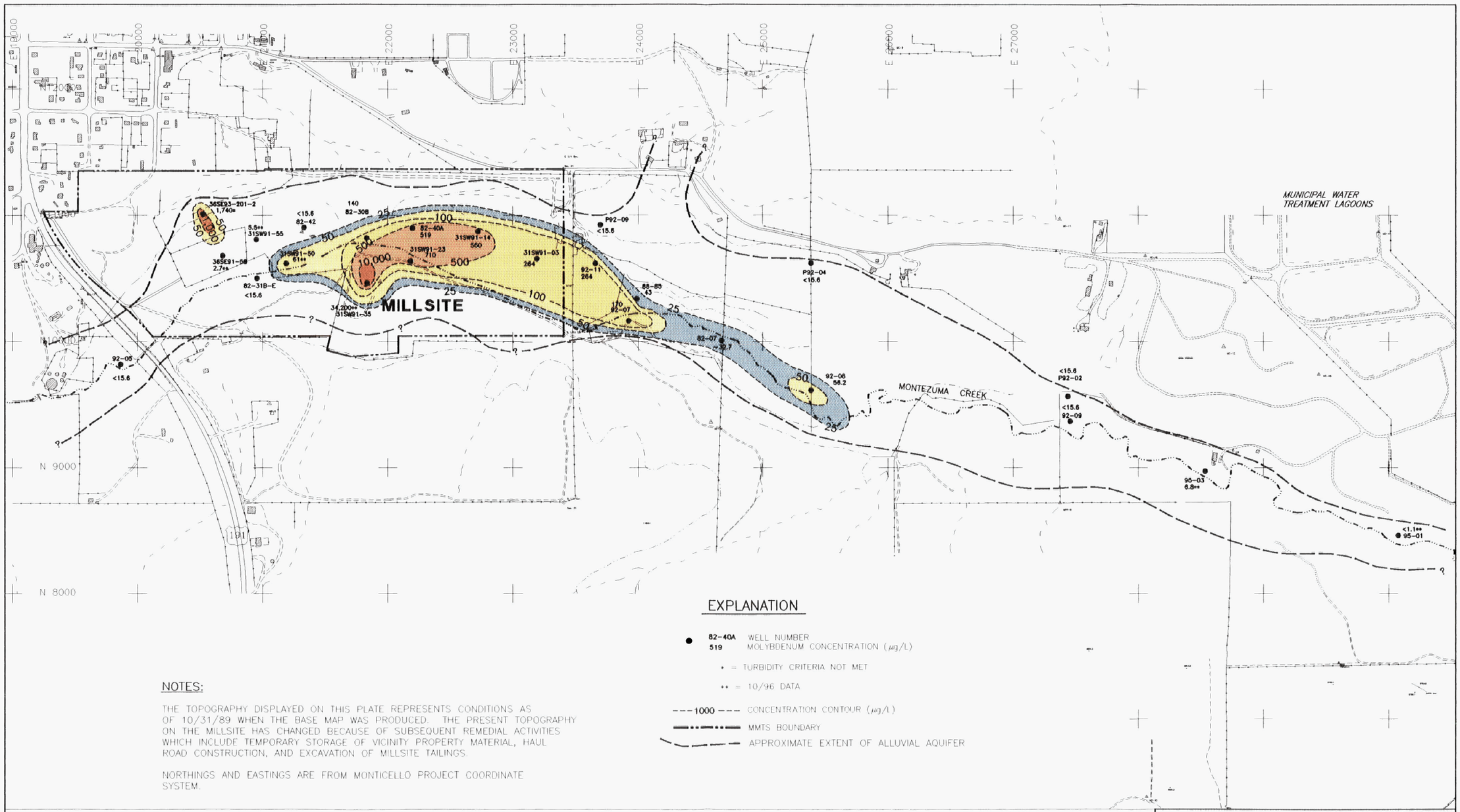
mactec-ers

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

U-234/238 PLUME MAP OCTOBER 1995

DATE PREPARED: MARCH 10, 1998

FILENAME: A00428-5



EXPLANATION

- 82-40A / 519 — WELL NUMBER / MOLYBDENUM CONCENTRATION (µg/L)
- * = TURBIDITY CRITERIA NOT MET
- ** = 10/96 DATA
- ---1000--- CONCENTRATION CONTOUR (µg/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

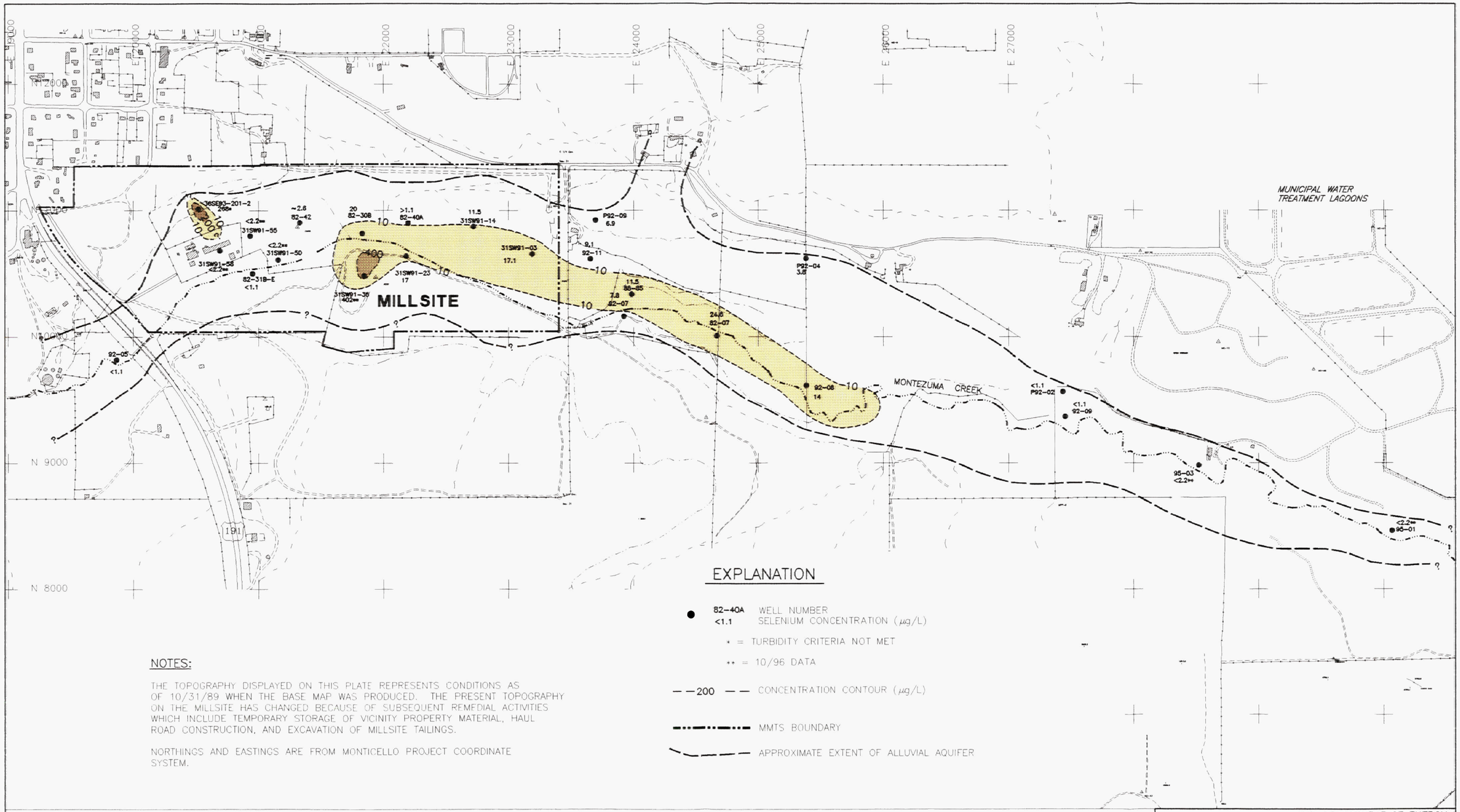
NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET
800 400 0 800 1600 2400

M:\ECR\034\0011\RC\A00427-5 01/20/98 5:10pm J50191

mactec-ers	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO
MOLYBDENUM PLUME MAP OCTOBER 1995	
DATE PREPARED: JANUARY 20, 1998	FILENAME: A00427-5



EXPLANATION

- 82-40A — WELL NUMBER
- <1.1 — SELENIUM CONCENTRATION (µg/L)
- * = TURBIDITY CRITERIA NOT MET
- ** = 10/96 DATA
- --200-- CONCENTRATION CONTOUR (µg/L)
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

N

SCALE IN FEET
800 400 0 800 1600 2400

M:\ECR\034\0011\A00426-5 01/18/98 7:13pm J50191

maclec-ers

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

SELENIUM PLUME MAP OCTOBER 1995

DATE PREPARED: JANUARY 18, 1998

FILENAME: A00426-5

MILLSITE

MUNICIPAL WATER

TREATMENT LAGOONS

MONTEZUMA CREEK

SOUTH CREEK

MATCH LINE

(ACTUAL WELL LOCATION APPROXIMATELY 135 FEET WEST)

(ACTUAL WELL LOCATION APPROXIMATELY 1429 FEET WEST)

SCALE IN FEET

400 200 0 400 800 1200

CONTOUR INTERVAL = 2 FEET

SCALE IN FEET

300 150 0 300 600 900

CONTOUR INTERVAL = 10 FEET

EXPLANATION

- ALLUVIAL GROUNDWATER MONITORING WELL (INCLUDES PIEZOMETERS AND LYSIMETERS)
- NEAR SOUTH SITE SHALLOW ZONE MONITORING WELL (QUATERNARY ALLUVIUM AND/OR WEATHERED MANCOS SHALE)
- UPPER MANCOS SHALE AND/OR WEATHERED MANCOS SHALE MONITORING WELL
- LOWER MANCOS SHALE MONITORING WELL
- LOWER DAKOTA SANDSTONE MONITORING WELL
- LOWER DAKOTA/BURRO CANYON AQUIFER MONITORING WELL
- BURRO CANYON AQUIFER MONITORING WELL
- ABANDONED WELLS, BOREHOLES, PIEZOMETERS AND LYSIMETERS
- MMTS BOUNDARY

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

maccor	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO
Plate 1	MONITORING WELLS, PIEZOMETERS, BOREHOLES/COREHOLES IN THE VICINITY OF OU III
DATE PREPARED: JUNE 17, 1998	FILENAME: Q0003500

M:\MSG\WTR\0001\Q0003500.DWG 06/17/98 1:29pm J50191

MILLSITE

MUNICIPAL WATER TREATMENT LAGOONS

MONTEZUMA CREEK

VANADIUM PILE

CARBONATE PILE

EAST TAILINGS PILE

ACID PILE

WEST

E 22000 E 23000 E 24000 E 25000 E 26000 E 27000 E 28000 E 29000 E 30000 E 31000

N12000 N11000 N10000 N9000

EXPLANATION

- 82-52 / 6834.94 — WELL NUMBER / GROUND WATER ELEVATION (FT.)
- TOPOGRAPHIC SURFACE ELEVATION CONTOUR (FT.)
- 6860 — GROUND WATER CONTOUR (FT.) GROUND WATER CONTOUR INTERVAL 5 FEET
- MMTS BOUNDARY
- APPROXIMATE EXTENT OF ALLUVIAL AQUIFER

N

SCALE IN FEET
400 200 0 400 800 1200
CONTOUR INTERVAL = 10 FEET

M:\MSG\WTR\0001\Q0001500.DWG 06/17/98 1:36pm J50191

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

macTec-ers	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO
Plate 2	ALLUVIAL AQUIFER PHREATIC SURFACE MAP MARCH 1996
DATE PREPARED: JUNE 17, 1998	FILENAME: Q0001500

PLT

OU III AR
569d
4-8-4

4

U.S. Department of Energy
Grand Junction Office
2597 B 3/4 Road
Grand Junction, CO 81503

AUG - 5 1998

Mr. Jerry Olds, Assistant State Engineer
State of Utah, Division of Water Rights
P.O. Box 146300
Salt Lake City, UT 84114-6300

Subject: Submittal of Additional Data For Application of Institutional Controls, Monticello, Utah

Ref: Letter from J. Tillman, DOE-GJO, to Jerry Olds, Utah Division of Water Rights, dated July 9, 1998, regarding Application of Institutional Controls

Dear Mr. Olds:

The enclosed data packet is being provided to support the U.S. Department of Energy-Grand Junction Office's (DOE-GJO) recent request that institutional controls be implemented in association with the Monticello Millsite–contaminated alluvial groundwater. The data packet includes a map identifying the areas where institutional controls need to be applied and a table that provides property-specific information.

It is the DOE-GJO's understanding that, once implemented, the use of institutional controls will act to prohibit future well installation and consumptive use of contaminated groundwater in the shallow alluvial aquifer for the included properties. The DOE-GJO anticipates that these institutional controls will need to be in place until the Monticello Remedial Action Project Operable Unit III CERCLA Record of Decision document is completed. The need for continued use of institutional controls will be reevaluated at that time. In the interim, DOE-GJO's groundwater monitoring activities will continue. Additionally, it is the DOE-GJO's understanding that a public review/comment period will be required to implement institutional controls. DOE-GJO will be contacting your office regarding this issue, should the State Engineer's Office grant the use of institutional controls as requested by DOE-GJO in the above-referenced letter.

Please contact me at (970) 248-7612 with questions or concerns. Thank you for your assistance in this matter.

Sincerely,

Donald R. Metzler
Project Manager

Enclosure

cc w/enclosure:
P. Mushovic, EPA
D. Bird, UDEQ/ERR
L. Morton, UDEQ-Rad
M. Butherus, MACTEC-ERS
Project File: MSG1.6.2.2[DOE]
Information Repository (2) (thru D. Richardson)

cc w/o enclosure:
A. Berry, DOE-GJO
W. Evelo, DOE-GJO
R. Plieness, DOE-GJO

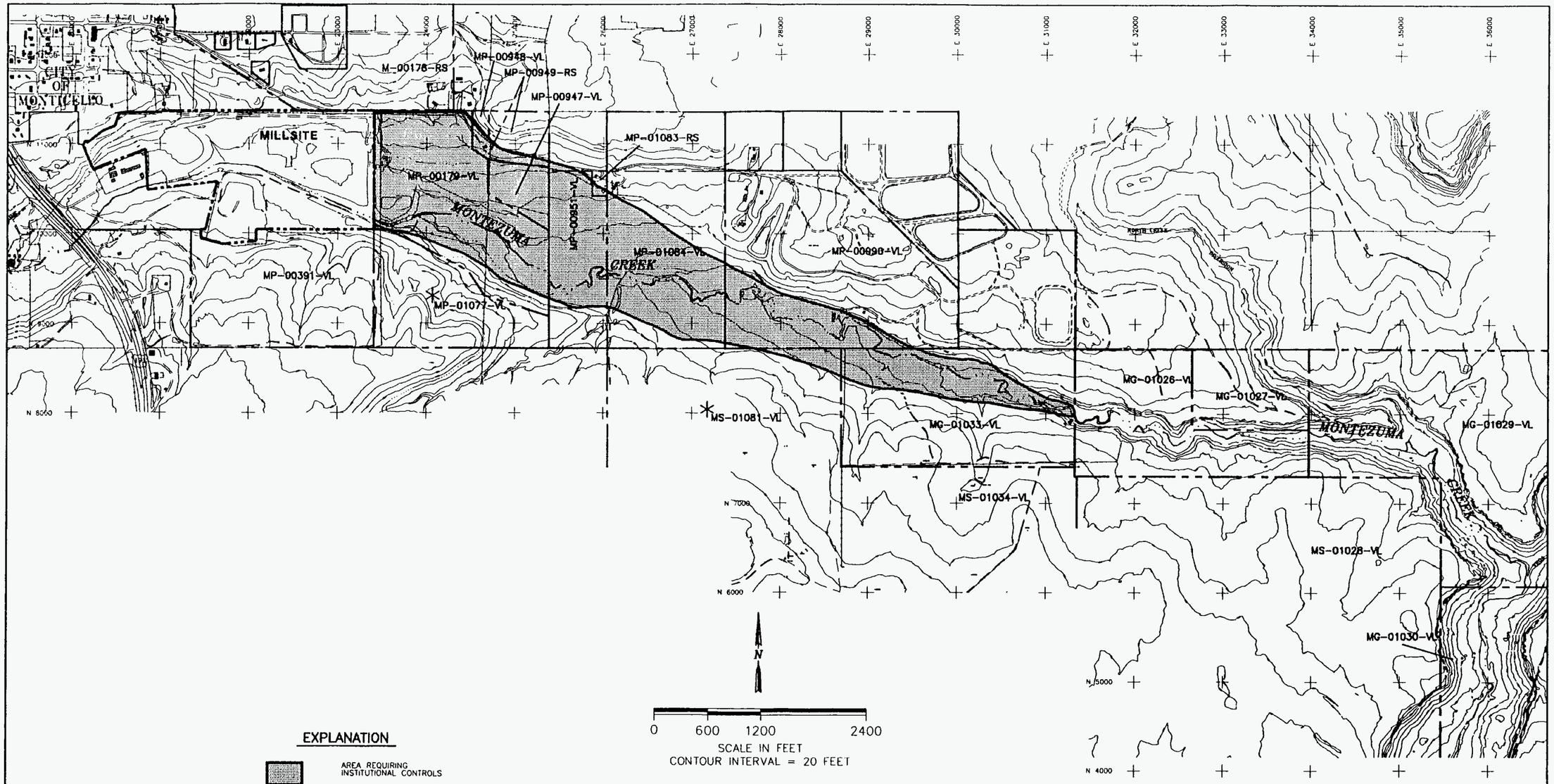
drm/institut.sou

Table 1. Institutional Controls Area Property Specific Data, Monticello, Utah

Property Owner Information (Mailing Address)	U.S. DOE Property Number/ Physical Address	San Juan County Assessor's Plat Number	Legal Description	Current Groundwater Rights[a]
R. Kedric and Z. Marleen Somerville P.O. Box 474 Monticello, Utah 84535 (435) 587-2441	MP-00179-VL Clay Hill Drive Monticello, Utah	33S24E317800	See Attachment A	None
R. Kedric and Z. Marleen Somerville P.O. Box 474 Monticello, Utah 84535 (435) 587-2441	MP-00947-VL East of Millsite Monticello, Utah	33S24E317201	See Attachment B	None
R. Kedric and Z. Marleen Somerville P.O. Box 474 Monticello, Utah 84535 (435) 587-2441	MP-00949-RS Clay Hill Drive Monticello, Utah	A33240310014	See Attachment C	None
Brian and Sherill Bowring P.O. Box 1185 Monticello, Utah 84535 (435) 587-3056	MP-00951-VL 1316 Clay Hill Drive Monticello, Utah	33S24E317200	See Attachment D	None
Brian and Sherill Bowring P.O. Box 1185 Monticello, Utah 84535 (435) 587-3056	MP-01083-RS 1716 Clay Hill Drive Monticello, Utah	A33230317203	See Attachment E	None

Property Owner Information (Mailing Address)	U.S. DOE Property Number/ Physical Address	San Juan County Assessor's Plat Number	Legal Description	Current Groundwater Rights[a]
Brian and Sherill Bowring P.O. Box 1185 Monticello, Utah 84535 (435) 587-3056	MP-01084-VL 1316 Clay Hill Drive Monticello, Utah	33S24E326000	See Attachment F	None
Sutherland Brothers, Inc. P.O. Box 218 Monticello, Utah 84535 (435) 587-2493	MP-00990-CS 1332 East Bar Cross Rd. Monticello, Utah	33S24E324800	See Attachment G	None
Sutherland Brothers Construction P.O. Box 218 Monticello, Utah 84535 (435) 587-2493	MG-01033-VL Monticello, Utah	34S24E050000	See Attachment H	None

[a] Information obtained from Utah Water Rights Records as listed on the Internet database.



EXPLANATION

- AREA REQUIRING INSTITUTIONAL CONTROLS
- TOPOGRAPHIC SURFACE ELEVATION CONTOUR
- MILLSITE BOUNDARY
- PROPERTY BOUNDARY
- MS-01081-VL — DOE PROPERTY ID NUMBER
- * — GOVERNMENT-OWNED PROPERTY DOES NOT REQUIRE INSTITUTIONAL CONTROLS

NOTES:

THE TOPOGRAPHY DISPLAYED ON THIS PLATE REPRESENTS CONDITIONS AS OF 10/31/89 WHEN THE BASE MAP WAS PRODUCED. THE PRESENT TOPOGRAPHY ON THE MILLSITE HAS CHANGED BECAUSE OF SUBSEQUENT REMEDIAL ACTIVITIES WHICH INCLUDE TEMPORARY STORAGE OF VICINITY PROPERTY MATERIAL, HAUL ROAD CONSTRUCTION, AND EXCAVATION OF MILLSITE TAILINGS.

NORTHINGS AND EASTINGS ARE FROM MONTICELLO PROJECT COORDINATE SYSTEM.

M:\MSG\WTR\0001\Q00122AA.DWG 07/24/98 11:27am J50191

macTec-ers	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION OFFICE GRAND JUNCTION, COLORADO
LOCATION OF GROUNDWATER INSTITUTIONAL CONTROLS, MONTICELLO, UTAH	
DATE PREPARED: JULY 24, 1998	FILENAME: Q00122AA

Attachment A

The legal description for property MP-00179-VL is as follows:

Beginning 660 feet west of the southeast corner of Section 31, T.33S, R.24E, Salt Lake Basin Meridian, San Juan County, Utah; thence north, 1,320 feet; thence north 58°47' west, 771.8 feet; thence north, 380 feet; thence north 57°30' west, 209 feet; thence north, 427.16 feet; thence west, to the center of said Section 31; thence south, 2,640 feet; thence east, 1,980 feet, to the point of beginning; except

Beginning at a point which is at the Southwest corner of the southeast of said Section 31, at a corner of a tract of land now or formerly owned by John L. Johnson and at a corner of a tract of land now or formerly owned by Clyde N. Christensen and Patricia Christensen; thence north 00 06'35" west along the west line of the southeast of said Section 31 which is along the boundary of said Christensen tract a distance of 1,377.3 feet; thence south 66 00'04" east 542.3 feet; thence south 62 90'45" east 643.6 feet; thence south 34 33'34" east 335.2 feet; thence south 72 47'52" east 763.5 feet, more or less, to a point which is on the east line of the west of the east of the southeast and 355.8 feet north 00 03'59" west of the south line of said Section 31; thence south 00 03'59" east 355.8 feet to a point on the south line of said Section 31 and on the boundary of a tract of land now or formerly owned by Mitchell H. Bailey, et al.; thence north 89 57'24" west along the south line of said Section 31 which is along the boundary of said Bailey tract a distance of 660.6 feet, more or less, to a point at a corner of said Bailey tract; thence continue north 89 57'24" west along the south line of said Section 31 a distance of 1,321.3 feet, more or less, to the point of beginning.

Attachment B

The legal description for property MP-00947-VL is as follows:

Beginning 660 feet west and 629.4 feet south of the east 1/4 corner of Section 31, T.33S, R.24E, Salt Lake Meridian, San Juan County, Utah; thence south 690.6 feet; thence north 58°47' west, 771.8 feet; thence north, 380 feet; thence south 84°54'35" east, 201.32 feet; thence south 80°37'25" east, 463.36 feet to the point of beginning.

Attachment C

The legal description for property MP-00949-RS is as follows:

Beginning 660 feet west of the east 1/4 corner of Section 31, T.33S, R.24E, Salt Lake Meridian, San Juan County, Utah; thence south, 629.4 feet; thence north 80°37'25" west, 463.36 feet; thence north 84°54'35" west, 201.32 feet; thence north 57°30' west, 209 feet; thence north 300 feet; thence south 41°00' east, 280 feet; thence north, 331 feet; thence east, 660 feet, more or less, to the point of beginning.

Attachment D

The legal description for property MP-00951-VL is as follows:

Beginning at a point 660 feet south of the east quarter corner of Section 31, T.33S., R.24E., Salt Lake Principal Meridian, San Juan County, Utah; thence south 1,980 feet, to the southeast corner of said Section 31; thence west, 660 feet; thence north, 1,980 feet; thence east, 660 feet to the point of beginning; except any portion within the right-of-way of Clay Hill Drive; and also except beginning at a point 660 feet south of the east quarter corner of said Section 31; thence west, 225 feet; thence south, 275 feet; thence east, 225 feet; thence north, 275 feet to the point of beginning.

Attachment E

The legal description for property MP-01083-RS is as follows:

Beginning at a point 660 feet south of the east quarter corner of Section 31, T.33S., R.24E., Salt Lake Principal Meridian, San Juan County, Utah; thence west, 225 feet; thence south 275 feet; thence east, 225 feet; thence north 275 feet, to the point of beginning; except any portion within the right-of-way of Clay Hill Drive.

Attachment F

The legal description for property MP-01084-VL is as follows:

The south ½ northwest ¼ southwest ¼ and also the southwest ¼ southwest ¼ of Section 32, T.33S., R.24E., Salt Lake Principal Meridian, San Juan County, Utah; except any portion within the right-of-way of Clay Hill Drive.

Attachment G

The legal description for property MP-00990-CS is as follows:

The south 1/4 northeast 1/4 southwest 1/4; southeast 1/4 southwest 1/4; west 1/2 southeast 1/4; of Section 32, T.33S, R.24E, Salt Lake Base Meridian: less the following described portion thereof:

Beginning at a point on the east boundary of the southwest 1/4 southeast 1/4 of Section 32; T.33S, R. 24E, Salt Lake Base Meridian; said point being north 89° 59' 47" west 1,325.22 feet and north 00° 05' 12" west 660.43 feet from the southeast corner of said Section 32; thence north 45° 07' 48" west 935.47 feet to a point on the south boundary of the northwest 1/4 southeast 1/4 of said Section 32; thence north 45° 07' 26" west 934.68 feet to a point on the west boundary of said northwest 1/4 southeast 1/4; thence north 00° 01' 54" west along said west boundary 659.94 feet to the center of said Section 32; thence north 89° 55' 07" east along the north boundary of the northwest 1/4 southeast 1/4 of said Section 32 a distance of 1,322.69 feet to the northeast corner of said northwest 1/4 southeast 1/4; thence south 00° 05' 12" east along the east boundary of the west 1/2 southeast 1/4 of said Section 32 a distance of 1,981.28 feet to the point of beginning.

Attachment H

The legal description for property MP-01033-VL is as follows:

Lots 1 and 2, Section 5, T34S, R24E, Salt Lake Base and Meridian, San Juan County, Utah.